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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

STAHL, MICHAEL J

ART UNIT	PAPER NUMBER
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2874

DATE MAILED: 05/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n N .

09/916,114

Applicant(s)

MAISENHOELDER ET AL.

Examiner

Mike Stahl

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-- The MAILING DATE of this c mmunication appears on the cover sheet with th correspondence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-62 and 77-92 is/are pending in the application.
- 4a) Of the above claim(s) 1-41 and 77-92 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 42-62 is/are rejected.
- 7) ☒ Claim(s) 42,47 and 61 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/1/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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Election

Applicant's election without traverse of claims 42-62 in the response filed March 1 2004 is acknowledged.

Specification

The disclosure is objected to because of the following informalities. At [0126] line 5, "nun" should be "mm". At [0044] line 7, [0125] line 6, [0126] lines 5 and 6, and [0131] line 4, every instance of "mn" should be "nm". Appropriate correction is required.

Claim Objections

Claims 42, 47, and 61 are objected to because of the following informalities. At claim 42 line 8, "Lithrow" should be "Littrow". At claim 47 line 2, "atransparent" should be "a transparent". At claim 61 line 3, "HfO.,Ny" should be "HfO_xN_y", and "A10,N_y" should be "AlO_xN_y". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 42-62 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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Claim 42 line 9 includes the term "preferably". A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 42 recites the broad recitation of an angular departure of no more than 10°, and the claim also recites an angular departure of no more than 5° which is the narrower statement of the range/limitation.

Claims 43-62 are rejected by dependence from indefinite claim 42. However, for purposes of comparison with the prior art in this office action, the examiner will assume that the broader limitation of claim 42 is in effect. Applicant should remove the narrower limitation from claim 42, and may add it in the form of a new dependent claim if desired.

Claims 43, 48, and 55 are additionally rejected because they use the term "preferably", and because claim 48 also uses the term "particularly". Claim 49 is additionally rejected as it depends from claim 48. Again the broader limitation in each of these claims will be assumed to be valid for purposes of comparison with prior art in this office action. The indefiniteness

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rejection of claims 43, 48, and 55 may be overcome in the manner proposed in the preceding paragraph with respect to claim 42.

Claim 44 is additionally rejected because it refers to "the at least one grating structure on the phase mask". This is not consistent with base claim 42 which recites only "a phase mask having a grating structure". If the phase mask is to include at least one grating structure, then claim 42 should be amended to reflect this limitation. For purposes of the present office action claim 44 will be interpreted as referring to a single grating structure on the phase mask in order to be consistent with claim 42.

Double Patenting

A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

Claims 42-62 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-21 of copending Application No. 10/182247. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented. It is noted that an election of claims 22-48 in 10/182247 was filed on December 23, 2003. However, conflicting claims 1-21 have not yet been canceled.

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Claims 42-62 are directed to the same invention as that of claims 1-21 of commonly assigned application 10/182247. The issue of priority under 35 U.S.C. 102(g) and possibly 35 U.S.C. 102(f) of this single invention must be resolved.

Since the U.S. Patent and Trademark Office normally will not institute an interference between applications or a patent and an application of common ownership (see MPEP § 2302), the assignee is required to state which entity is the prior inventor of the conflicting subject matter. A terminal disclaimer has no effect in this situation since the basis for refusing more than one patent is priority of invention under 35 U.S.C. 102(f) or (g) and not an extension of monopoly.

Failure to comply with this requirement will result in a holding of abandonment of this application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 42-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lyndin et al. (US 6218194) in view of Capodieci (US 6013396).

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Claim 42: Lyndin discloses a process for producing a grating structure including the steps of covering a substrate 1 with a photoresist layer 61, exposing the layer through a phase mask having a grating structure, developing the photoresist layer, etching the substrate surface to produce a grating pattern in the substrate, and removing the photoresist layer (col. 9 line 62 – col. 10 line 5; figs. 6a-6d). It is considered inherent that the light used for exposure is incident perpendicular to the phase mask (i.e. no deviation from a 0° incident angle) since this is common practice. The distance between consecutive grating lines (i.e. the grating period) is 800 nm, 740 nm, or 730 nm for the examples in Table I (all these distances are within the range recited by claim 42). Also note col. 3 line 67 – col. 4 line 2.

Lyndin is silent as to the specific structure of the phase mask used to expose the grating pattern. Capodieci discloses a phase mask for use in this type of photolithographic process. The mask uses a quartz substrate carrying a patterned opaque chromium layer, and in one embodiment (figs. 11-12D) the phase mask is created using a two-beam interference method. Capodieci teaches that the disclosed masks provide even better resolution than conventional chrome-on-quartz masks such as those shown in figs. 3A and 3B. Thus it would have been obvious to a person having ordinary skill in the art to specifically use the Capodieci mask with the Lyndin process, since it would clearly be desirable to maximize the available grating resolution. The proposed combination just described would have satisfied the limitations of claims 42 and 47-49. The resultant product would have met the requirements of claim 62.

Claim 43: The length of the grating may be up to 2 cm (col. 4 lines 50-52).

Claim 44: Lyndin and Capodieci do not describe the surface area of the grating structure on the phase mask. However, this is regarded as an obvious engineering choice since a person of

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ordinary skill in the art would know how to determine the surface area of the grating structure on the mask such that it will yield desired characteristics for the grating to be formed on the substrate. A skilled person would also be aware of other relevant factors, e.g. how much of the substrate can be effectively processed at once, how difficult or expensive is it to fabricate a phase mask of a given size, and so forth.

Claims 45 and 46: Lyndin does not specify the light source used for exposure. However, it would have been obvious to a skilled worker to specifically use a mercury vapor lamp or an argon or excimer laser because these types of UV sources are ubiquitously used in photolithography and are readily available.

Claims 50 and 53: Lyndin and Capodieci do not disclose an antireflection layer either on the side of the phase mask facing the photoresist layer, or on the photoresist layer prior to exposure. However, antireflection layers are old and well known. It is known in the art that spurious reflections between the phase mask and the photoresist layer reduce the contrast of the exposed grating because they essentially add noise to the interference pattern generated through the phase mask. Accordingly it would have been obvious to a person having ordinary skill in the art at the time the invention was made to apply antireflection coatings to the substrate-side of the phase mask, to the photoresist layer, or both in order to preserve the desired grating pattern.

Claims 51 and 54: Lyndin does not specify the distance between the photoresist layer and the phase mask during the exposure step. However, it would have been obvious to a person having ordinary skill in the art to determine a suitable or optimum distance between the photoresist layer and the phase mask for a given fabrication environment. It is known for example that vacuum contact gives the tightest contact between the phase mask and the

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photoresist layer, and can provide the highest contrast of the interference pattern. Yet it is also known that vacuum contact subjects the phase mask to higher mechanical stresses and consequently a higher risk of breakage than for larger mask/substrate separations. Of course it is also recognized that too great a separation would significantly reduce the contrast of the interference pattern. A skilled worker in the photolithography art would know how to weigh these factors, among others, to choose a proper distance.

Claim 52: Lyndin does not specify a photoresist layer thickness of 200 nm or less. The only photoresist layer thickness mentioned in the reference is approximately 700 nm (col. 9 lines 63-64). However, this is given in the context of an exemplary fabrication process and is not critical to Lyndin's invention. It would have been obvious to a person of ordinary skill in the art to choose a suitable photoresist layer thickness for a given fabrication environment based on parameters such as cost of the photoresist material, deposition time, exposure and development time, and so forth.

Claim 55: The substrate etching may be done with a reactive ion etching procedure (col. 10 lines 1-5).

Claim 56: The substrate 1 is silica (quartz) (col. 6 lines 44-48).

Claim 57: A transparent layer 2 having a refractive index different from that of the substrate is applied to the surface portion after applying the grating structure (col. 10 lines 5-7; col. 9 Table I).

Claim 58: Lyndin does not characterize the variation of the coupling angle along the line of the grating or the absolute deviation of the coupling angle from a target value. Nevertheless it would have been obvious to a skilled person to specify performance standards such as those

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recited in claim 58 and to ensure that the fabrication process meets those standards so that a desired level of grating uniformity or process repeatability can be achieved. It is noted that there is nothing in Lyndin which suggests that there would be any appreciable variation in the coupling angle along the grating lines or deviation of the coupling angle from a preset value.

Claim 59: In the exemplary embodiment cited above, the transparent layer (i.e. waveguide 2) is deposited by chemical vapor deposition. However, it would have been obvious to someone of ordinary skill in the art to deposit this layer using any of the old and well-developed deposition techniques, including magnetron sputtering specifically, as appropriate for a given manufacturing environment.

Claim 60: For the exemplary structures listed in col. 9 Table I, the thickness of the transparent layer (waveguide 2) is approximately 160 nm which is within the claimed range. Note also col. 3 lines 60-63.

Claim 61: The transparent layer may include HfO_2 , Si_3N_4 , Ta_2O_5 , or TiO_2 (col. 3 lines 51-53).

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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Conclusion

The following references are cited on attached form PTO-892 as being pertinent to this application: US 2002/0180941, US 2003/0091284, US 5718738, and US 5738825.

Any inquiry concerning this communication should be directed to Mike Stahl at (571) 272-2360. Official communications which are eligible for submission by facsimile and which pertain to this application may be faxed to (703) 872-9306. Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the technical support staff supervisor at (571) 272-1626.

MJS

Michael J. Stahl
Patent Examiner
Art Unit 2874

May 16, 2004



Rodney Bovernick
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